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# *Adverse Impacts of Furlough Programs on Employee Work Rate and Organizational Productivity*

 **Adedeji Badiru**

This article is primarily a research-provoking exposition against the management approach used in the 2013 government furlough program. It is intended to prompt potentially productive research investigations on the impact of personnel furloughs, particularly on defense acquisition programs. Defense acquisition programs are time-sensitive and systems-oriented. What appears as a minor delay in one unit of an acquisition life cycle can lead to long-term encumbrances within the entire defense system, resulting in enormous cost escalation. Pertinent analytical techniques/methodologies are provided to illustrate potential pathways for further research studies of furloughs and how they adversely impact organizational productivity. The author's intent is to provoke research so that future furloughs can be better conceived, planned, executed, and managed—or avoided altogether.



High-dollar acquisition programs that suffer productivity impediments can lead to enormous cost escalations. A case example (Carey, 2012) is the 2012 revelation by the U.S. Government Accountability Office (GAO) that the U.S. Air Force would spend \$9.7 billion over 20 years to upgrade the capabilities of the F-22A Raptor as a result of the failure to anticipate the plane's long-term need for technology modernization. In high-cost and time-sensitive programs such as the F-22A Raptor, any additional slowdown and work rate decline in the acquisition process can result in adverse impacts on the overall readiness of the nation. Workforce work rate has a direct impact on overall organizational productivity. The very premise of the defense acquisition program is to ensure timely acquisition and deployment of critical technology to aid the warfighter. The purpose of this article is to provide thought-provoking research methodologies to analyze the management of furlough programs with respect to work productivity. Furlough-induced work slowdown in one segment of a defense organization can lead to overall work rate decline, with a resultant decline in overall productivity and cost escalation. A furlough program takes both leadership and employees away from productive work because planning spans multiple weeks. Although the hypothesis of the article is anecdotal, it does present the basis for further empirical studies. This article is intended to provoke more data-driven research on employee work rate analysis. Because 100 percent of the work cannot be done by fewer human resources working at the normal work rate during a furlough, a research study is needed to guide future decisions.

### **Impacts of Furlough Programs on Acquisition Systems**

Program delays are triggered by many possible sources, including those caused by a lack of cohesive budget agreement and political discord, which result in the need for furloughs. Three leading sources of delays in acquisition programs are

- technological limitations, such as a sluggish maturation of new technology;
- externally imposed limitations, such as the prevailing global economic developments; and

- self-induced procedural limitations, such as political discord or procedural inefficiency.

The ongoing federal budget sequestration is wreaking havoc on organizational productivity throughout the Department of Defense (DoD). An August 1, 2013, news headline read, “New Air Force center to lose 1.3M hours to sequester” (Barber, 2013). The news went on to affirm how the mid-year sequestration budget cuts are adversely affecting the Air Force Life Cycle Management Center (LCMC). A productivity loss of 1.03 million hours, depending on the base wage rate used, can translate to as much as \$70 million. Taking into consideration the 600,000-plus employees across DoD during a furlough program, 100 percent of the work obviously cannot be fulfilled by the furlough-depleted workforce working at the original work rate. The economic impact of the reduction of work output is a good topic for future research. For a sequestration program that is purportedly saving money, losing that much money is a move in the wrong direction. In addition to the serious financial impacts of furlough programs on family take-home disposable incomes, social well-being and community economic performance also suffer grave consequences. Those personal impacts, coupled with organizational loss of productivity, make the net cost savings of furlough programs negligible.


### **Logistics and Acquisition Disaggregation**

Stone (2013) emphasizes how the civilian furlough period caused delays in moving and maintaining equipment at a time that the military cannot afford any operational disruption. The wartime drawdown is just one piece of the jigsaw complexity of military logistics and acquisition. A poorly executed furlough program complicates an already complex undertaking. People and equipment have to be moved under a tight schedule with a shrinking base budget.

The civilian workforce provides a key linkage between everything that has to be done. Reducing the availability of the workforce through a furlough program at a critical time impedes the overall goal of the DoD. To reiterate, 100 percent of the work cannot be done by a reduced workforce working at the original work rate.

### **Furloughs and Loss of Productivity**

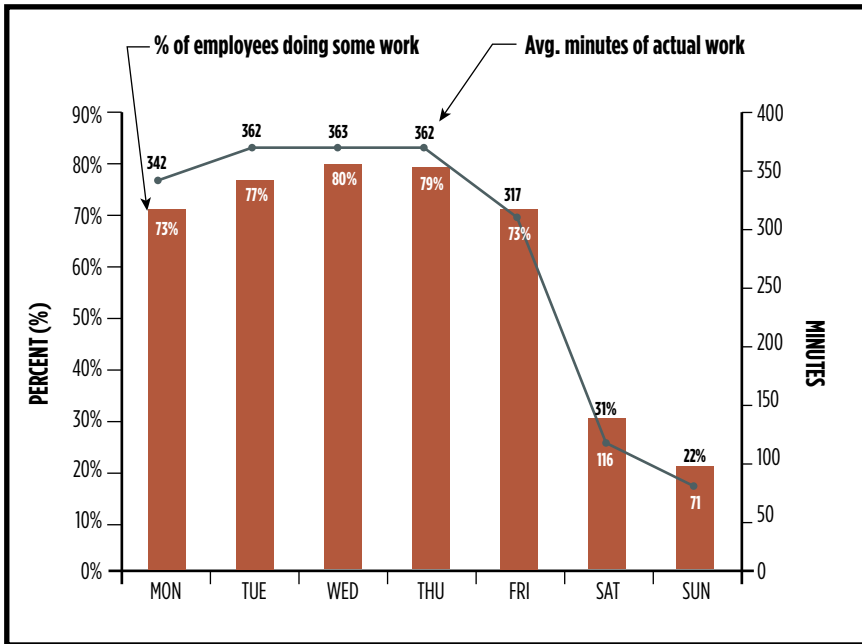
Employee furloughs, as a mechanism to achieve federal budget savings, do have deleterious effects on employee morale, functional coordination, and employee work rates. When morale is low, all other



factors of productivity are adversely impacted. Thus, furloughs have several unintended consequences. In essence, employee furloughs do not offer much in the way of long-term benefits. Work backlogs that are caused by furloughs subsequently take months to complete. To protect personnel-related data, hypothetical values are used in the computational examples. Organizations wishing to implement the computational methodologies presented in this article will use their own unit-specific data values. One anticipated benefit of the article is that it will open up avenues for discussions and more rational decisions in advance of any future furlough programs. Ideally, any future furlough programs can be better conceived, planned, executed, and managed—or avoided altogether. In the author's own furlough experience, the 2013 DoD furlough program created protracted planning, execution ambiguity, disjointed implementations, uncertainty of expectations, inconsistent guidance, and disruption of workflow processes. The resultant adverse impacts degraded overall organizational productivity and impeded national defense preparedness.

For the specific case at Wright-Patterson Air Force Base, the furlough period began the week of July 8, 2013, for about 10,000 civilians. In the initial DoD implementation, civilians who were affected by the furlough were expected to endure a scheduled unpaid day off each week for a total of 11 furlough days. Although this was later cut down to six furlough days, the productivity damage had already been done. Considering that the same amount of work had to be accomplished, furloughed employees were expected to prioritize tasks to determine what gets done and what gets compromised.

In the absence of a standardized process, employees may inadvertently marginalize high-value tasks. Even flexibility for an employee to choose which day of the week to take a furlough has some unanticipated adverse impacts. In a normal workweek devoid of furlough or sequestration distractions, Monday is typically the busiest (but not necessarily the most productive) day of the week. Tuesday is seen as the most productive day while Friday is the least busy day and, potentially, least productive. This phenomenon is a human cultural reaction to the progression of a workweek that has been confirmed by several labor research studies (Dawkins & Tulsi, 1990; Pettengill, 1993; Weiss, 1996; Hill, 2000; Pettengill, 2003; Campolieti & Hyatt, 2006; Chandra, 2006; Taylor, 2006; Bryson & Forth, 2007a; Bryson & Forth, 2007b; Golden, 2011). One adverse impact of variable furlough days is the difficulty

**FIGURE 1. WORK-DAY-BASED RAMP-UP AND RAMP-DOWN OF WORKER PRODUCTIVITY**

Note. Adapted from, "Are There Day-of-the-Week Productivity Effects?" by A. Bryson & J. Forth, Centre for Economic Performance, The London School of Economics and Political Science, 2007a.

in synchronizing work across functional areas, which leads to overall diminished work output. Figure 1 illustrates a similar diminished work output based on a study by Bryson and Forth (2007a). While the data in the study do not represent DoD acquisition workforce of interest, the productivity ramp-up and ramp-down process is evident in every workforce; and the topic is fertile for future research.

According to a probability distribution law called the Pareto Distribution, and judging by normal human nature in 80 percent of the population, some less-motivated workers, if given the option of picking a furlough day, will pick Monday. Monday, being the busiest day, is the day to opt out of work. The research literature has confirmed that Monday experiences the highest level of sick-day call-ins (KRONOS®, 2004). Friday, a normally slow day, is perceived as a day to come to work, knowing that typically not much work stress will occur on that day. These two bipolar behavioral observations will, thus, have greater adverse impact on



overall productivity than what a normal furlough day might be expected to produce. The normally busy Monday suffers in two ways: (a) reduced workforce due to furlough, and (b) critical work pushed further down the week due to elective furlough-day selection.

The situation can be compounded by some people taking Friday off one week, then taking Monday off the next week. Due to several subtle factors such as the above, getting two full workday equivalents out of Monday and Friday proves fallacious in actual practice. The following actual, but paraphrased statement typifies the type of negative work impacts that the uncoordinated furlough program and sequestration caused (personal communication with a co-worker, July 30, 2013). This statement is in response to a query following a critical task that went uncompleted and untracked for weeks:

I apologize for the delay. While waiting for a response, I put the request in a follow-up folder; since I am part-time, and we have taken on the responsibilities of laid-off employees, not to mention the day of work we lose due to the furlough, it has taken me this long to get a moment to follow up on the task. Please know that I do not intend to make excuses, but merely to explain the circumstances.

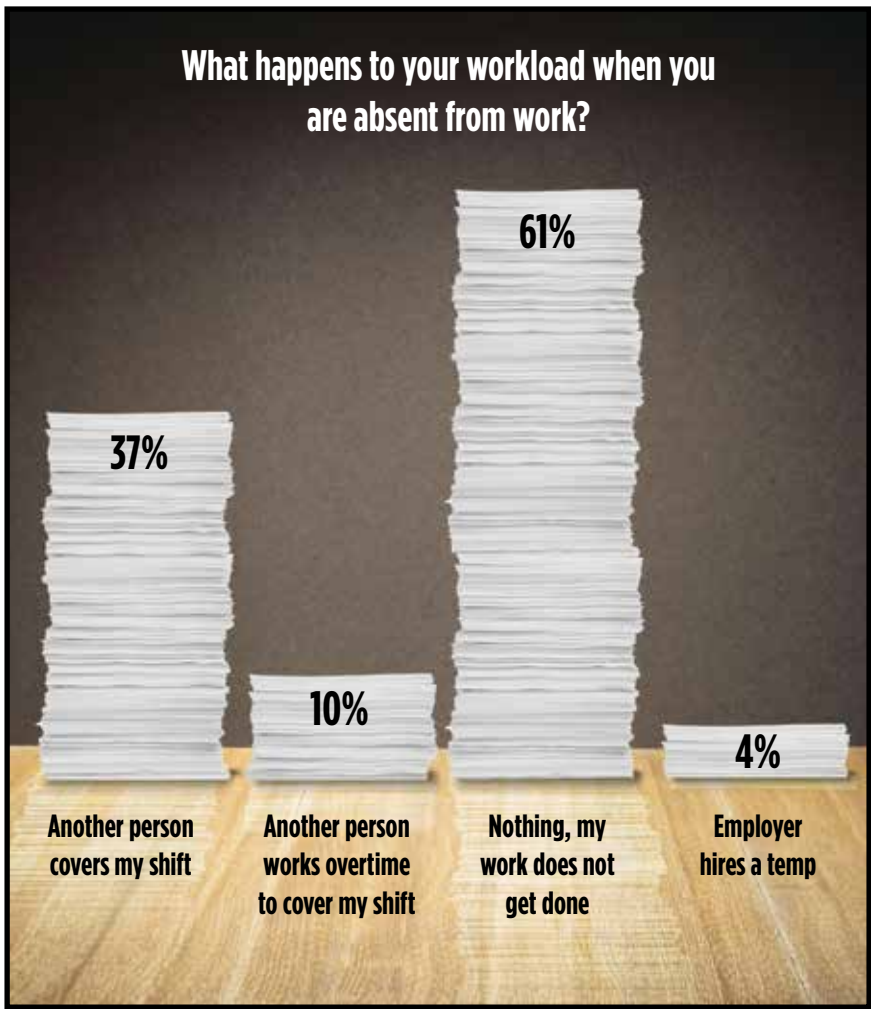
Figure 2, based on a 2004 survey conducted by Harris Interactive for KRONOS®, Inc., illustrates that 61 percent of respondents report that “nothing gets done on their workload when they are absent from work.” The population surveyed was a general office workforce. While this is not a DoD workforce, similarities are noted in the office work environment of both populations.

Where human work is concerned, the psychology of work must be taken into account when deciding on new work practices either as a response to budgetary pressures or in pursuit of process improvement goals. The literature is replete with relevant research studies in this regard (Baltes, Briggs, Wright, & Neuman, 1999; Hamermesh, 1999; Bailey & Kurland, 2002; Askenazy, 2004; Berg, Appelbaum, Bailey, & Kalleberg, 2004; Bertschek & Kaiser, 2004; Böheim & Taylor, 2004; Heisz & LaRochelle-Côté, 2006; Altman & Golden, 2007; Kelliher & Anderson, 2010). Unfortunately, technical workforce teams, such as those in defense acquisition programs, are rarely studied with respect to the best way to manage work schedules. Therein lies a flaw in the



across-the-board implementation of the present furlough program. Even the peer review process of this journal, *Defense ARJ*, is encumbered by the furlough program.

**FIGURE 2. ADVERSE IMPACT OF FURLOUGHS ON PRODUCTIVITY**



Note. Adapted from “Working in America: Absent Workforce,” by KRONOS® Inc., 2004.



## The Link between Productivity and Operational Cost

The U.S. Government is using the SAVE (Securing Americans Value and Efficiency) program to solicit ideas from all federal employees to help identify areas where the nation can “cut wasteful spending.” A review of the SAVE award Web site at <http://www.whitehouse.gov> shows that 89,000 ideas have been submitted over the past 4 years since the program started in 2009. It should be noted, however, that any cut of “wasteful spending” should be coupled with a mitigation of the subtle avenues of eroding productivity. Blake (2011) reports that improving functional productivity can translate to lower operating cost. “Industrial engineers make systems function better together with less waste, better quality, and fewer resources.”

As with every organization, a major goal of the U.S. Air Force is to eliminate waste, in consonance with the federal goal of cutting wasteful spending. In spite of its goal, some cost-cutting programs instead have the unintended consequence of reducing productivity, which increases operating costs. Consequently, the savings from cutting wasteful spending are nullified by the higher cost of lower productivity. An uncoordinated implementation of furlough programs is one glaring example of “robbing Peter to pay Paul.” Efficiency, effectiveness, productivity, and cost reduction must be integrated analytically to get the desired composite organizational benefits. Organizational performance is defined in terms of several organization-specific metrics, which include efficiency, effectiveness, and productivity. The existing techniques for improving efficiency, effectiveness, and productivity (Badiru & Thomas, 2013, and all the references therein) are suitable for analyzing the impacts of furloughs. Efficiency refers to the extent to which a resource (time, money, effort, etc.) is properly utilized to achieve an expected outcome. The goal, thus, is to minimize resource expenditure, reduce waste, eliminate unnecessary effort, and maximize output. The ideal (i.e., the perfect case) is to have 100 percent efficiency. This is rarely possible in practice. Usually expressed as a percentage, efficiency ( $e$ ) is computed as output over input:

$$e = \frac{\text{output}}{\text{input}} = \frac{\text{result}}{\text{effort}}.$$

The above ratio is also adapted for measuring productivity (Badiru & Thomas, 2013).

Effectiveness is primarily concerned with achieving the specific objectives, which constitute the broad goals of an organization. To model effectiveness quantitatively, we can consider the fact that an “objective” is essentially an “output” related to the numerator of the efficiency equation above. Thus, we can assess the extent to which the various objectives of an organization are met with respect to the available resources. Although efficiency and effectiveness often go hand-in-hand, they are, indeed, different and distinct. For example, one can forego efficiency for the sake of getting a particular objective accomplished. Consider the statement, “if we can get it done, money is no object.” The military, by virtue of being mission-driven, often operates this way. If, for instance, our goal is to go from point A to point B to hit a target—and we do hit the target, no matter what it takes—then we are effective. We may not be efficient based on the amount of resources expended to hit the target. A cost-based measure of effectiveness is defined as:

$$ef = \frac{S_o}{c_o}, \quad c_o > 0$$

Where:

$ef$  = measure of effectiveness on interval (0, 1)

$S_o$  = level of satisfaction of the objective (rated on a scale of 0 to 1)

$c_o$  = cost of achieving the objective (expressed in pertinent cost basis: money, time, measurable resource, etc.)

If an objective is fully achieved, its satisfaction rating will be 1. If not achieved at all, it will be zero. Thus, having the cost in the denominator gives a measure of achieving the objective per unit cost. If the effectiveness measures of achieving several objectives are to be compared, then the denominator (i.e., cost) will need to be normalized to a uniform scale. The overall system effectiveness can be computed as the summation that follows:

$$ef_c = \sum_{i=1}^n \frac{S_o}{c_o}$$

Where:

$ef_c$  = composite effectiveness measure

$n$  = number of objectives in the effectiveness window

Depending on the units used, the effectiveness measure may be very small with respect to the magnitude of the cost denominator. This may be handled by converting the measure to a scale of 0 to 100. Thus, the highest comparative effectiveness per unit cost will be 100 while the lowest will be 0. The above quantitative measure of effectiveness makes most sense when comparing alternatives for achieving a specific objective. If the effectiveness of achieving an objective is desired in noncomparative absolute terms, it would be necessary to determine the range of costs, minimum to maximum, applicable for achieving the objective. Then, we can assess how well we satisfy the objective with the expenditure of the maximum cost versus the expenditure of the minimum cost. By analogy, “killing two birds with one stone” is efficient. By comparison, the question of effectiveness is whether we kill a bird with one stone or kill the same bird with two stones, if the primary goal is to kill the bird nonetheless. In technical terms, systems that are designed with parallel redundancy can be effective, but not necessarily efficient. In such cases, the goal is to be effective (get the job done) rather than to be efficient. Productivity is a measure of throughput per unit time. Typical productivity formulas include the following:

$$P = \frac{Q}{q}$$

$$P = \frac{Q}{q}(u)$$

where  $P$  = Productivity;  $Q$  = Output quantity;  $q$  = Input quantity; and  $u$  = Utilization percentage. Notice that  $Q/q$  also represents efficiency (i.e., output/input) as defined earlier. Applying the utilization percentage to this ratio modifies the ratio to provide actual productivity yield. The acquisition workforce is composed primarily of knowledge workers, whose productivity must be measured in alternate terms, perhaps through work rate analysis, which is a focus in this article. Rifkin (2011) presents the following productivity equation suitable for implementation for the acquisition environment:

*Product* (i.e., output) = *Productivity* (objects per person-time) x *Effort* (person-time)

where *Effort* = *Duration* x *Number of People*.



While changes are essential for organizational improvement, they should be implemented in smaller manageable chunks, possibly incrementally, with respect to cost-cutting measures rather than one big furlough period. Organizational focus should be on gradual incremental improvement rather than one-fell-swoop drastic implementation of budget cuts. These two points need to be addressed in further detail via further research studies that are based on life data collection and analysis. The goal of this article is to provoke research by pointing out some basic examples of analytical computations.

### Work Rate Computations

Work rate and work time availability are essential components of estimating the cost of specific tasks. Given a certain amount of work that must be done at a given work rate, the required time can be computed. Once the required time is known, the cost of the task can be computed on the basis of a specified cost-per-unit time. Work rate analysis is important for resource substitution decisions. The analysis can help identify where and when the same amount of work can be done with the same level of quality and within a reasonable time span by a less expensive resource. As a potential future research topic, learning curve analysis may be used to predict the expected work rate. Although not generally applicable across the board for government work, learning curves are still useful for cases where work output accountability is tracked. The general relationship among work, work rate, and time is given by:

$$\text{work done} = (\text{work rate})(\text{time})$$

$$w = rt$$

where:

$w$  = the amount of actual work done expressed in appropriate units. Examples of work units are number of contract reviews completed, lines of computer code typed, gallons of oil spill cleaned, units of a product produced, and surface area painted

$r$  = the rate at which the work is accomplished (i.e., work accomplished per unit time)

$t$  = the total time required to perform the work excluding any embedded idle times

For simplification, work is defined as a physical measure of accomplishment with a uniform density. For example, cleaning 1 gallon of oil spill may be as desirable as cleaning any other gallon of oil spill within the same work environment. The production of one unit of a product is identical to the production of any other unit of the product. If uniform work density cannot be assumed for the particular work being analyzed, weighting factors must be applied to the elements contained in the relationship. Uniformity can be enhanced if the scope of the analysis is limited to discrete work elements of similar design. The larger the scope of the analysis, the more the variability from one work unit to another, and the less uniform the overall work measurement will be. For example, in a project involving the construction of 50 miles of surface road, the work analysis may be done in increments of 10 miles at a time rather than the total 50 miles. If the total amount of work to be analyzed is defined as one whole unit, then the relationship below can be developed for the case of a single resource performing the work, with the parameters below:

Work rate:  $r$

Time:  $t$

Work done: 100 percent (1.0)

The work rate,  $r$ , is the amount of work accomplished per unit time. For a single resource to perform the whole unit (100 percent) of the work, we must have the following:

$$rt = 1.0$$

For example, if an acquisition technician is to complete one work unit in 30 minutes, that technician must work at the rate of  $1/30$  of the work content per unit time. If the work rate is too low, then only a fraction of the required work will be performed. The information about the proportion of work completed may be useful for productivity measurement purposes. In the case of multiple technicians performing the work simultaneously, the work relationship is as presented in Table 1.



TABLE 1. WORK RATE TABULATION FOR MULTIPLE TECHNICIANS

Technician, <i>i</i>	Work rate, <i>r<sub>i</sub></i>	Time <i>t<sub>i</sub></i>	Work done <i>w</i>
Technician 1	<i>r<sub>1</sub></i>	<i>t<sub>1</sub></i>	( <i>r<sub>1</sub></i> )( <i>t<sub>1</sub></i> )
Technician 2	<i>r<sub>2</sub></i>	<i>t<sub>2</sub></i>	( <i>r<sub>2</sub></i> )( <i>t<sub>2</sub></i> )
...	...	...	...
Technician <i>n</i>	<i>r<sub>n</sub></i>	<i>t<sub>n</sub></i>	( <i>r<sub>n</sub></i> )( <i>t<sub>n</sub></i> )
Total			1.0

Even though the multiple technicians may work at different rates, the sum of the work they all performed must equal the required whole unit. In general, for multiple resources we have the following relationship:

$$\sum_{i=1}^n r_i t_i = 1.0$$

where

*n* = number of different resource types

*r<sub>i</sub>* = work rate of resource type *i*

*t<sub>i</sub>* = work time of resource type *i*

For partial completion of work, the relationship is

$$\sum_{i=1}^n r_i t_i = p$$

where *p* is the proportion of the required work actually completed. In any furlough program, the expectation of 100 percent work completion does not match reality. Under a furlough program, only a fraction of the expected work will get done.

Employee Work Rate Examples

Under a furlough program, there can be no expectation that 100 percent of the work can be accomplished with a 20 percent reduction of human resources operating at the prefurlough work rate. Suppose Technician A, working alone, can complete a task in 50 minutes. After working on the task for 10 minutes, Technician B is brought in to work with Technician A to complete the job. Both technicians, working together as a team, finish the remaining work in 15 minutes. We are interested in finding the work rate for Technician B if the amount of work to be done is 1.0 whole unit (i.e., 100 percent of the job). The work rate of Technician A is 1/50. The amount of work completed by Technician A in 10 minutes, working alone, is (1/50)(10) = 1/5 of the required total work. Therefore, the remaining amount of work to be done is 4/5 of the required total work. That is:

$$\frac{15}{50} + 15(r_2) = \frac{4}{5}$$

which yields  $r_2 = 1/30$ . Thus, the work rate for Technician B is 1/30. That means Technician B, working alone, can perform the same job in 30 minutes. A tabulated summary of this example is shown in Table 2.

TABLE 2. WORK RATE TABULATION FOR TECHNICIANS A AND B

Technician, <i>i</i>	Work rate, <i>r<sub>i</sub></i>	Time <i>t<sub>i</sub></i>	Work done <i>w</i>
Technician A	1/50	15	15/50
Technician B	<i>r<sub>2</sub></i>	15	15( <i>r<sub>2</sub></i> )
Total			1.0

In this example, it is assumed that both technicians produce an identical quality of work. If quality levels are not identical, we must consider the potentials for quality-time trade-offs in performing the required work. The relative costs of the different technician skills needed to perform the required work may be incorporated into the analysis as shown in Table 3.



TABLE 3. INCORPORATION OF WAGE COST INTO WORK RATE ANALYSIS

Technician, <i>i</i>	Work rate, <i>r<sub>i</sub></i>	Time <i>t<sub>i</sub></i>	Work done <i>w</i>	Pay rate <i>p<sub>i</sub></i>	Wage <i>P<sub>i</sub></i>
A	<i>r<sub>1</sub></i>	<i>t<sub>1</sub></i>	( <i>r<sub>1</sub></i> )( <i>t<sub>1</sub></i> )	<i>p<sub>1</sub></i>	<i>P<sub>1</sub></i>
B	<i>r<sub>2</sub></i>	<i>t<sub>2</sub></i>	( <i>r<sub>2</sub></i> )( <i>t<sub>2</sub></i> )	<i>p<sub>2</sub></i>	<i>P<sub>2</sub></i>
...	...	...	...	...	...
<i>n</i>	<i>r<sub>n</sub></i>	<i>t<sub>n</sub></i>	( <i>r<sub>n</sub></i> )( <i>t<sub>n</sub></i> )	<i>p<sub>n</sub></i>	<i>P<sub>n</sub></i>
Total			1.0	Budget	

Using the above relationship for work rate and cost, the work crew can be analyzed to determine the best strategy for accomplishing the required work, within the required time and within a specified budget, in a climate of a furlough program. For another simple example of possible acquisition scenarios, consider a case where an acquisition information technology (IT) technician can install new IT software at three work stations every 4 hours. At this known rate, it becomes possible to compute how long it would take the technician to install the same software at five work stations. The proportion that “three stations” is to 4 hours is equivalent to the proportion that “five stations” is to *x* hours, where *x* represents the number of hours the technician would take to install software in the five stations. This gives the following work-and-time ratio relationship:

$$\frac{3 \text{ work stations}}{4 \text{ hours}} = \frac{5 \text{ work stations}}{x \text{ hours}},$$

which yields *x* = 6 hours, 40 minutes. Now consider a situation where the technician’s competence with the software installation degrades over time for whatever reason, possibly due to furlough interruptions. We will see that the time requirements for the IT software installation will vary depending on the current competency level and the availability of the technician. Consider another example where an acquisition analyst can do contract checks at the rate of 120 contract line items per minute. A supervisor can inspect the checkmarks at the rate of three per second. How many supervisors are needed to keep up with 18 acquisition analysts? At the work rate given, one analyst can complete the task at the rate of two per second (i.e., 120 checkmarks every 60 seconds). So,

18 analysts would complete 36 checkmarks per second. Now let  $x$  be the number of supervisors needed to keep up with the 18 analysts. Since one supervisor completes three inspections per second,  $x$  supervisors would inspect  $3x$  checkmarks per second. That is,  $3x = 36$ , which yields  $x = 12$  supervisors. Overall work slowdown will occur if, due to furloughs, the supervisors needed are not available to keep up with the workload. By the author's own estimation in his direct furlough experience, as much as 25 percent of required work process checkmarks may be missed.

Another illustrative example: Suppose that because of Team Member 1's work rate, a certain task can be performed in 30 days. The addition of Team Member 2 to the task is desirable so that the completion time of the task can be reduced. The work rate of Team Member 2 is such that the same task can be performed alone in 22 days. If Team Member 1 has already worked 12 days on the task before Team Member 2 joins the effort, we want to find the completion time of the task if Team Member 1 starts the task at time 0. The amount of work to be done is 1.0 whole unit (i.e., the full task). The work rate of Team Member 1 is  $1/30$  of the task per unit time. The work rate of Team Member 2 is  $1/22$  of the task per unit time. The amount of work completed by Team Member 1 in the 12 days, working alone, is  $(1/30)(12) = 2/5$  (or 40 percent) of the required work. Therefore, the remaining work to be done is  $3/5$  (or 60 percent) of the full task. If we let  $T$  be the time for which both members work together, then we will have the following work-and-time equation:

$$T/30 + T/22 = 3/5$$

which yields  $T = 7.62$  days. Thus, the completion time of the task is  $(12 + T) = 19.62$  days from time zero. It is assumed that both members produce identical quality of work and that the respective work rates remain consistent. The respective costs of the different resource types may be incorporated into the work rate analysis to determine where real cost savings can be achieved.

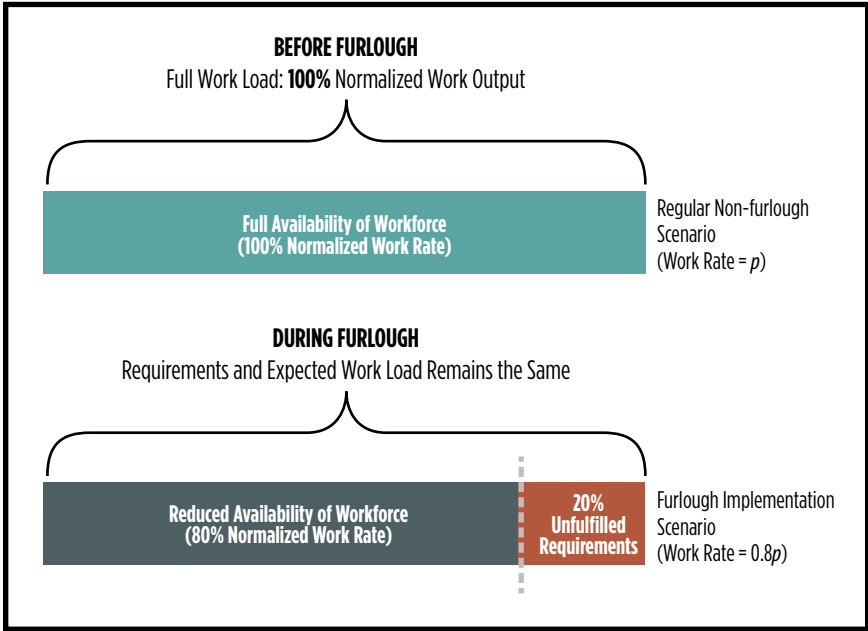
### **Furlough-Induced Work Rate and Productivity**

The key benefit of doing an analytical work rate analysis is that the disconnection between employee work and the prevailing workload can be brought to the forefront. As a case example, the 2013 implementation of furlough days at Wright-Patterson Air Force Base required each eligible employee to go on furlough 1 day each workweek for 11 weeks, which was later reduced to 6 weeks. For each week, this represented a

20 percent loss of availability to work. Meanwhile, the workload was not adjusted downward to account for the 20 percent loss of employee time availability. This resulted in an effort to do the same workload (even more, in some cases) with less employee time. A simple Pareto plot of this work scenario quickly reveals a serious disconnect. To balance the equation, either the work rate of employees will have to increase or the expected work output (i.e., requirements) will need to be reduced. Figure 3 shows a pictorial representation of this disconnection.

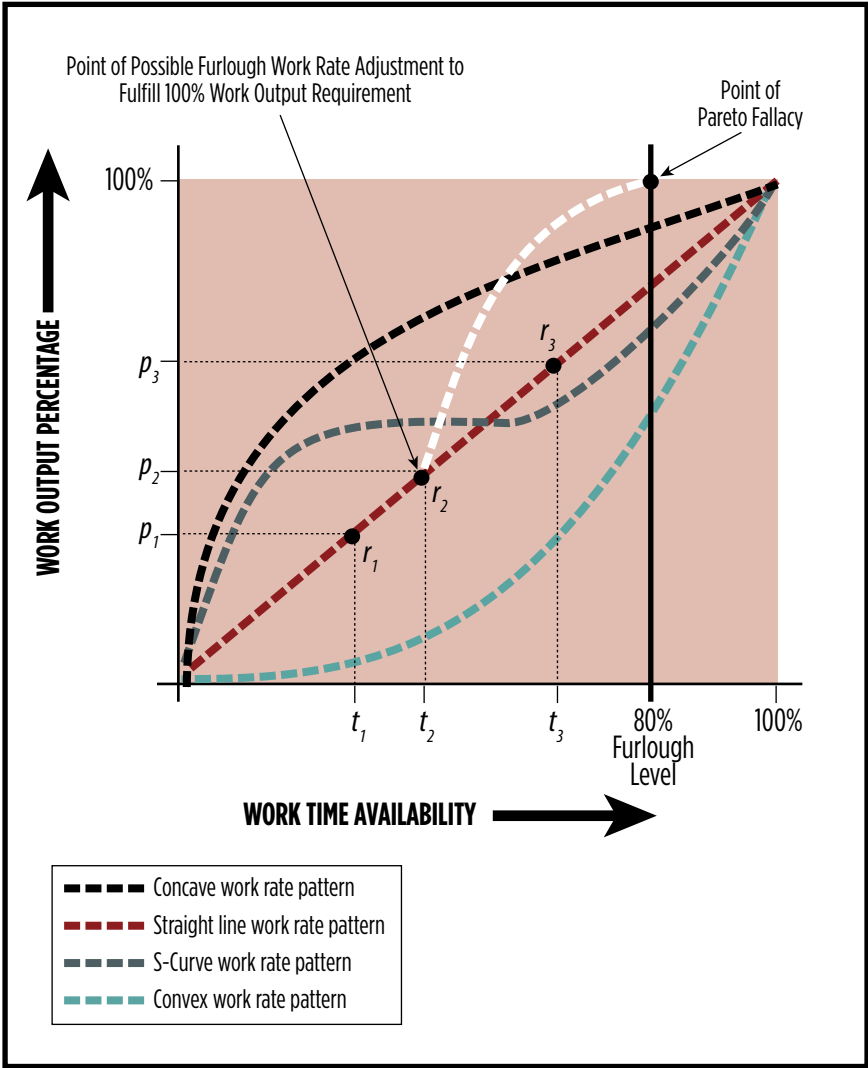
Figure 4 presents examples of furlough work rate adjustment curves. The black curve represents a concave path for 100 percent completion of the workload at 100 percent employee work time availability. The red curve follows a straight-line path for work completion at 100 percent-for-100 percent work rate. The green curve follows an S-curve for completing the full workload. The blue curve represents a convex path for executing the 100 percent workload at 100 percent employee time availability. If employee time availability is cut to 80 percent (i.e., one workday furlough per workweek) as in the DoD furlough implementation, employee work rates must be adjusted upward if the expected workload

**FIGURE 3. PARETO ANALYSIS OF FURLOUGH WORK RATE VERSUS REQUIREMENTS WORK LOAD**



is still to be accomplished. This is represented by the white curve starting at the point  $r_2$  and ending at the intersection of 100 percent workload and 80 percent work time availability. The  $r_2$  point was selected because it offers a mid-range point on the curve. In other words, we still accomplish most (if not all) of the required work using only 80 percent work time availability. But this is at the expense of a higher midstream work rate of the employee. Something will have to be compromised if we are

FIGURE 4. FURLOUGH WORK RATE ADJUSTMENT CURVES



expecting the same work output from the same standard work rate under a reduction in work time availability. It should be pointed out, though, that the presumption of 100 percent completion of government work is not realistic. The concept may work analytically for countable units of production, but not directly for office-type work outputs. The concept, nonetheless, does provide guidance for rational thought about managing office work output under the condition of a furlough program.

We can now apply the above analysis to the previous example of team work rate analysis. If work rates remain the same, we must either reduce the work content or increase the duration (number of days) over which the task is accomplished. If the task duration is to be kept the same at  $D = 19.62$  days, then work rates must be adjusted. Let us assume the following notations:

$x_1$  = Normal work rate of Team Member 1

$x_{1(f)}$  = Furlough work rate of Team Member 1

$x_2$  = Normal work rate of Team Member 2

$x_{2(f)}$  = Furlough work rate of Team Member 2

$D$  = Fixed expected task duration in days = 19.62 days

$T$  = Number of days remaining to due date = 19.62 days – 12 days  
= 7.62 days

Normally, Team Member 1 can complete the task in 30 days at a work rate of  $1/30$ . So,  $x_1 = 1/30$ . From the data given previously,  $x_2 = 1/22$ . Team Member 1 works for 12 days before handing over to Team Member 2. Assuming that the work rate of Team Member 2 is the one to be adjusted while keeping  $r_{1(\text{normal})}$  constant, we see that Team Member 1 completes  $1/30$  work-unit-per-day times 12 days, which yields  $2/5$  of the work content completed by Team Member 1 working alone. This leaves  $3/5$  of the work to be completed by Member 2. This gives us the relationship equation below:

$T(x_1) + T(x_{2(f)}) = \text{Work Content Remaining To Be Done}$



That is:

$$7.62(1/30) + 7.62(x_{2(f)}) = 3/5$$

But Member 1 hands over to Member 2 due to going on furlough. So, the above equation reduces to Member 2 working alone to complete the remaining 60 percent portion of the task in the 7.62 days before the due date. That is:

$$7.62(x_{2(f)}) = 3/5$$

which yields  $x_{2(f)} = 0.07874$  work content per day. This is considerably higher than the normal work rate of  $1/22$  (i.e., 0.04545) for Member 2. In fact, it is 173.25 percent of the normal work rate for Member 2, which is not practical to accomplish.

### Better Management of Furlough Programs

The Department of Defense is made of teams of military personnel, government civilians, and contractors, who are all expected to work together seamlessly. Any furlough program that targets only one segment of the collaborative teams will create long-lasting disruptions that will nullify the intended benefits of defense teams. While one group is on furlough, the nonfurlough groups cannot work at the best level of their potential. A prior analytical view of military-civilian work rate integration can help determine a better way to manage or avoid furloughs. Based on the analytical template presented above, the author recommends that future furlough programs, if there must be any, be managed with a consideration of the systems impact of employee absences. Systems engineering tools, such as the V-model (Defense Acquisition University, n.d.) and DEJI-model (Badiru, 2012) can be explored during the initial stages of furlough deliberations to determine how decision factors intermingled with respect to considerations for people, technology, and work processes. Figure 5 illustrates some of the factors of consideration in applying the DEJI-model.

**FIGURE 5. FURLOUGH PROGRAM DESIGN, EVALUATION, JUSTIFICATION, AND INTEGRATION**

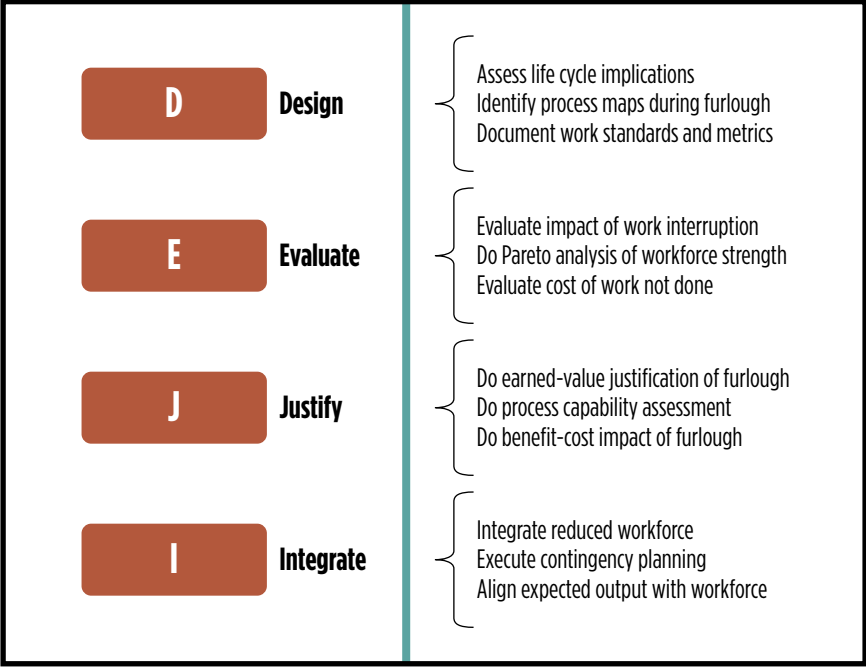
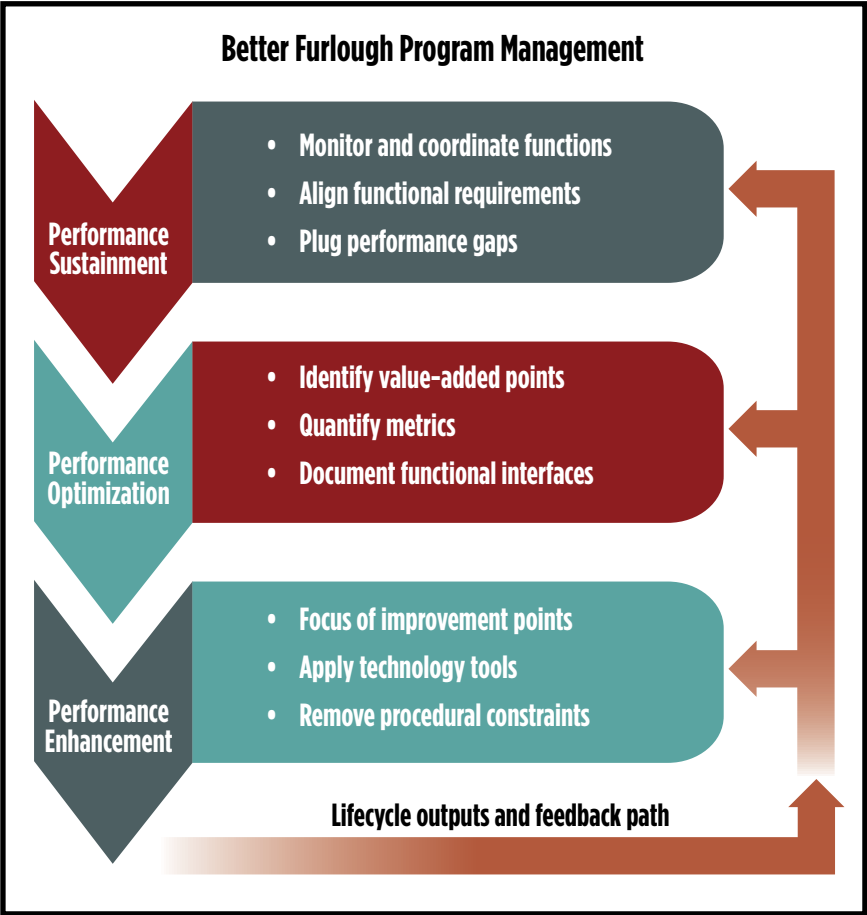


Figure 6 presents a flowchart of performance sustainment, leading to possible performance optimization and resulting in performance enhancement. Once performance enhancement is achieved, it would be fed back as a sustainment goal for monitoring and coordinating functions. In such a flow process, the potential adverse impact of a furlough program can be identified earlier and in advance.

**Implementation Strategy**

The simple process of communication, cooperation, and coordination can be used to get everyone on board for a furlough program. Projects are executed and accomplished through the collective efforts of people, tools, and processes. Communication is the glue that binds all these together. The author’s own observations indicate that most project failures can be traced to poor communication at the beginning. Even in highly machined/controlled processes, the occasional human intervention can spell doom for a project if proper communication is not in effect. We often erroneously jump to the coordination phase of a project, believing that this is where project execution lies. But the fact is that a

**FIGURE 6. LIFE-CYCLE FEEDBACK MODEL FOR BETTER FURLOUGH PROGRAM MANAGEMENT**



more fundamental foundation for project success lies well before the coordination phase. The author advocates building a structural project execution hierarchy, starting with Communication, which facilitates Cooperation, which paves the way for Coordination, and ending with the desired project success. That is, every project should build a project flow process as shown below:

Communication → Cooperation → Coordination → Program Success

In the above process, investing in people communication is the easiest thing that an organization can do. Regardless of whatever technological tools, technical expertise, and enhanced processes are available in the project environment, basic human communication is required to get a project started right and moving forward efficiently and effectively. Communication highlights what must be done and when. It can also help to identify the resources (personnel, equipment, facilities, etc.) required for each effort. It points out important questions such as:

- Does each project participant know what the objective is?
- Does each participant know his or her role in achieving the objective?
- What obstacles may prevent a participant from playing his or her role effectively?
- Does each person have “buy-in” into the project?

Communication can mitigate disparity between concept and practice because it explicitly solicits information about the critical aspects of a project in terms of the Who, What, Why, When, Where, and How of the project. By using this approach, we can avoid taking cooperation for granted. Cooperation must be explicitly pursued through clear communication of the project requirements. Cooperation works only when each cooperating individual inwardly believes in the project and makes a personal commitment to support the project. Ceremonial signing-off on a project is not a guarantee of cooperation. Rather, subconscious signing-into the project is what makes a sustainable cooperation. This can only be achieved through communication, extended appropriately and received properly.


## Conclusions and Recommendations

The purpose of this article is not to indict DoD’s 2013 furlough program, which is necessitated by the national-level budget sequestration problem. Rather, the article seeks to sensitize decision makers to the diversity of critical issues and factors involved in any DoD furlough program, particularly if it affects the acquisition community. For example, the Weapon Systems Acquisition Reform Act and the Defense Acquisition Workforce Improvement Act represent two of the several



initiatives designed to improve the acquisition process. But to realize real and lasting improvements, which have been elusive so far, new practical approaches must be explored and sustained. But when the adverse impact of a furlough program is added on top of the existing challenges, it becomes even more difficult to achieve acquisition excellence or sustain any improvement already achieved. The recommendations derived from this article are summarized below:

- While changes are essential for organizational improvement, they should be implemented in smaller manageable chunks with respect to implementing furloughs in incremental cost-cutting measures rather than one big furlough period.
- Focus should be on gradual incremental improvement rather than one-fell-swoop drastic implementation of budget cuts.

- 
- Early and clear communication should be used to clarify the requirements and impacts to allay the fear of those affected.
  - The personal needs and welfare of employees should be given priority in the execution of furlough programs.
  - The questions of who, what, why, when, and how of the furlough program should be clearly delineated upfront to minimize ambiguity.

A final take-away from this article is succinct, but nevertheless profound: 100 percent of the work during a furlough cannot be done with fewer resources at the original work rate.

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